

Pre-emptive swarm control

**Talk to Bridgend BKA 12th April
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By Wally Shaw

Swarming

- Simply **reproduction** – colony's sole aim in life
- Everything a colony does is designed to improve chances of **successful** reproduction
- In their book entitled '**Bait Hives for Honey Bees**', Seeley and Morse state that, '**mature colonies have a natural urge to swarm each year unless weakened by disease or mismanagement**'
- So perhaps we should not be surprised when colonies swarm
- Beekeeping books understate swarming
- Beekeepers do the same – being economical with the truth or simply don't know?

Terminology

Usual terminology swarm **control** and **prevention**
– which is which and where is the dividing line?

Biological threshold (point of no return) comes
when queen cells are started (**or is it?**)

So clearer terminology is:-

- **Pre-emptive swarm control** – what the beekeeper can do before queen cells are present (to prevent their initiation)
- **Re-active swarm control** – what the beekeeper can do when queen cells are produced (to prevent the issue of swarms)

Are queen cups with contents the true start of swarming?

Until recently I thought this was true **BUT:-**

- Studies using observation hives show changed behaviour (by the workers) towards the queen up to 14 days before any sign of queen cells
- Queen is subjected to 'vibration signal' (VS) with increasing frequency
- At same time is fed more - thought to increase her laying
- Just before queen cells produced VS stops
- After queen cells started VS starts again – with increasing frequency
- Queen is fed less – she slims down
- VS stops abruptly and colony swarms

What's happening here and how do we know?

- A joined-up process lasting about 3 weeks
- When behaviour starts is colony in a condition of **latent swarming**?
- Nothing the beekeeper can pick up on during routine hive inspection
- May explain why some hives that have been provided with extra space for queen to lay – but not used - suddenly produce queen cells
- Very frustrating this!!
- Can swarming be stopped at this **latent stage**?
- Splitting **does** seem to be effective

Pre-emptive swarm control

Management activities involved are **multi-purpose** (good beekeeping) – not just about preventing queen cells being started

Other aims include:-

- Promoting a large colony capable of collecting a large crop of honey
- Systematic renewal of brood combs – particularly important for disease prevention
- Queen replacement and making increase

What we are attempting to prevent



Honey production

- Most beekeepers' primary aim honey production
- To produce large crops of honey need large colonies – ratio of foraging strength to colony overheads
- Unless nectar flows predictable, need to maintain colony size over 3-4 months
- **BUT the larger the colony and the longer it is in that condition, the more likely it is to swarm**
- Swarming (if uncontrolled) is the enemy of honey production
- So this problem is not easy to solve!!

Management strategies for honey production

Five main strategies beekeeper can adopt:-

- 1) Try to keep colony together for the whole season = good crop but if fail becomes strategy 3) or 4)
- 2) Split colony at a carefully chosen point in the season = good crop, possibly better than 1)
- 3) Wait until queen cells present and do artificial swarm = usually a reduced crop
- 4) Allow colony swarm, catch swarm, hive it and prevent cast swarms = good crop if succeed but if fail becomes 5)
- 5) Laissez faire (let alone) – just add supers and hope = usually poor crop but can get lucky

Triggers for swarming

A mixture of internal and external conditions

Internal

- Size of colony, space for queen to lay, brood nest maturity, age of the queen and congestion
- Space for nectar processing and honey storage
- Production and/or distribution of queen substance (thought to be the main mechanism)

External

- Time in season - swarming urge at peak in May and June
- Weather – an underrated factor?

What can the beekeeper do?

- We can to some extent control internal conditions through management of hive and particularly the brood area
- But can do nothing about the time of year or the weather

Influence of weather

- Largely ignored in beekeeping books
- The exception is L.E. Snelgrove who, writing about swarming, noted – ***‘In our part of world (he lived in N. Somerset) the vagaries of the weather present unexpected problems to the apiarist which tax to the utmost his patience and resourcefulness’.***
- I am sure Wales has at least as many climatic ‘vagaries’ as Somerset - and then some!!

Weather acts through reduction in flying time

After 5-7 days of poor weather (depressions coming in from the Atlantic) a high proportion of fully developed colonies will have started queen cells

- Poor weather limits flying time so they stay home
- It's cold so, despite having supers, most bees congregate in the brood area
- This simulates hive congestion and the colony responds by starting queen cells
- Does this happen in other parts of the country?

The weapons available for pre-emptive swarm control

The following are the main management techniques by which we can control hive internal conditions:-

1. Comb management
2. Box management
3. Brood relocation
4. Spitting colonies

One side issue first - queen clipping?

This is not really a method of pre-emptive swarm control:-

- Does **NOT** prevent initiation of swarm cells
- Merely delays issue of the main swarm – less frequent colony inspection possible
- Downside is that you stand good chance of losing the (valuable) existing queen
- Can be adapted for use with honey production strategy 4) – allow colony to swarm

PART 1. Comb management

Ensuring that all (or most) of the combs in the brood area are used for brood rearing:-

- Want to minimize the storage of honey and pollen in the brood area
- Remove frames that are not being used to their full potential and replace with empty drawn combs or foundation
- Process starts in autumn of previous season
- If contents of removed frames have value can use a **dump box**

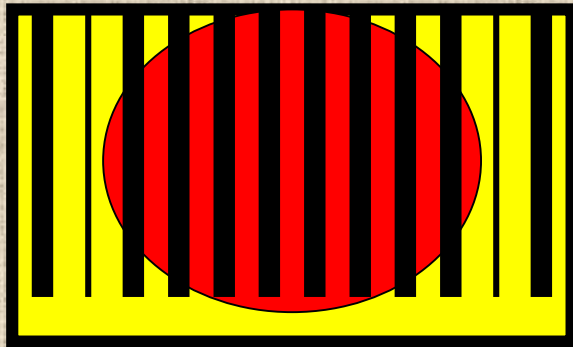
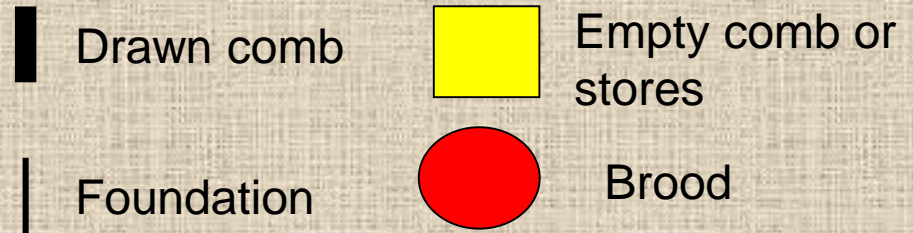
Use of foundation in deep brood box

- Comb drawing inhibits initiation of queen cells – it **simulates brood nest immaturity**
- Introduction of foundation must be done at the right time and in right position
- Early in season foundation **must** be introduced on edge of brood nest
- Later, when colony is crammed with bees, can be interleaved with brood frames
- Never put foundation next to the hive wall
- **Use of foundation has the dual purpose of pre-emptive swarm control and brood frame renewal**
- **Queen also lays more in new comb**

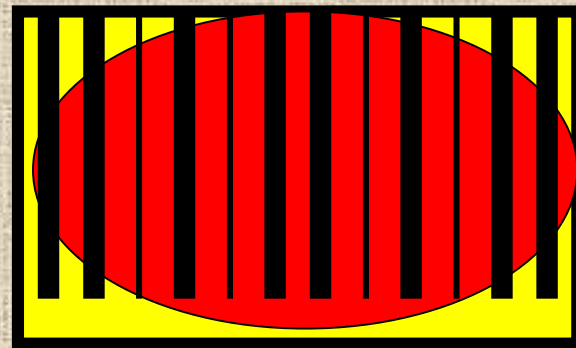
Two basic rules for getting foundation drawn

- 1) Bees MUST have an immediate use for comb to extend the brood nest or for storage**
- 2) Bees don't do 'speculative' comb building**
- 3) There MUST be a nectar flow (or the beekeeper must provide one) – bees do not use stored honey for wax making**
 - Making wax and drawing comb is an 'expensive' activity – 1lb wax takes 8lb of honey (they say)
 - But does that include the work and extra heat required for comb building?

Getting foundation drawn in the deep brood nest



Early season positioning of foundation



Later season positioning of foundation

What to do with removed frames

- Poor frames taken out of circulation, cleaned and re-foundationed
- Good frames containing food can be used to as feed frames for nucs or placed in **dump box**
- Frames with small amounts of brood can also be placed in **dump box**

What is a dump box?

- An empty box (deep or shallow) placed on top of a hive in the apiary
- Provides storage for frames (with contents) removed during comb management
- Incomplete sets should be flanked by dummy boards
- Drone brood should be culled
- If any worker eggs or larvae present need to check for queen cells (after 5-7 days)
- If frames not used for some other purpose during season become part of honey harvest
- See Welsh Beekeeper No. 175 Winter 2011

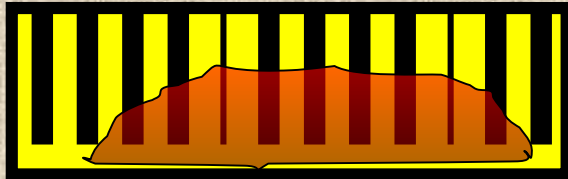
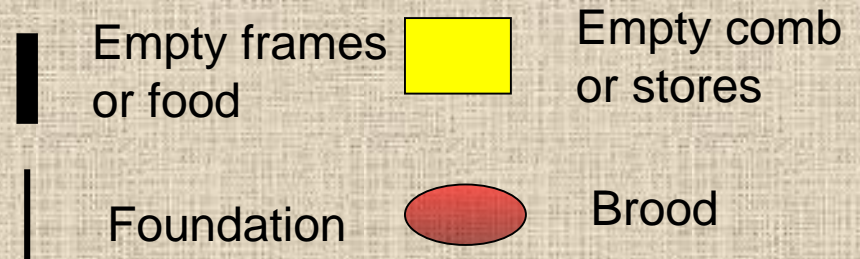
Warning!!

If brood disease present (or even a threat) must NOT use dump box or any other form of management that transfers frames from one hive to another

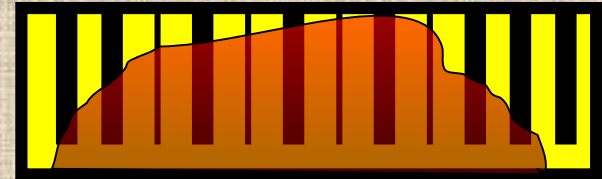
Use of foundation in shallow brood box

- Shallow brood often neglected part of hive
- More latitude with the positioning of foundation
- Foundation should placed inside the brood nest – if positioned outside will be used to store for honey
- Shallow box on top of deep box means it is warmer for brood and comb drawing is easier for the bees

Getting foundation drawn in the shallow brood nest



Early season positioning of foundation



Later season positioning of foundation

Comb management in extra deep boxes

- Foundation can be introduced in the same way as for ordinary deep
- Problem is what to do with removed frames if they have useful contents and are not destined to be destroyed?
- Logically should have some extra deep boxes or nucs available

(Personally don't fancy having an extra deep dump box on top of a hive – full of honey 70-80lbs!!)

Expanding brood nest in extra deep box

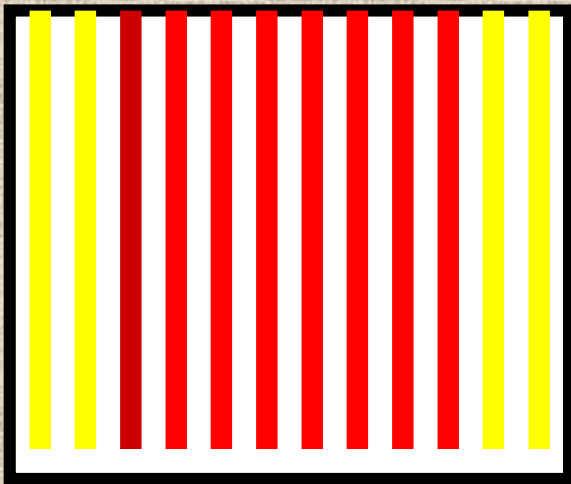


Brood

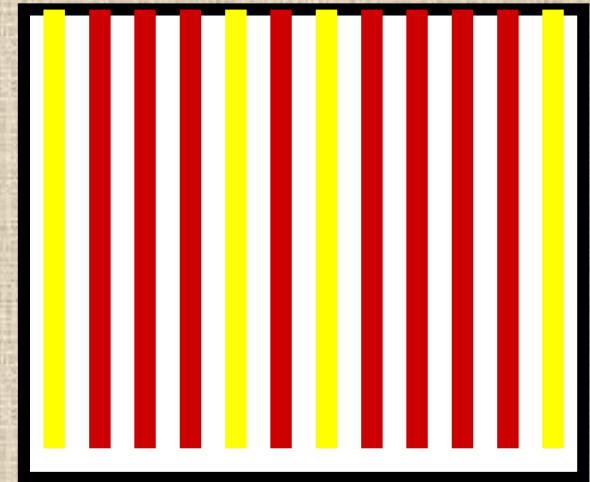


Food

Honey
cappings
scored



Before comb management with
8 frames brood and 4 of food



After comb management with 2
frames of food uncapped and
moved to middle of brood nest

PART 2. Box management (brood area)

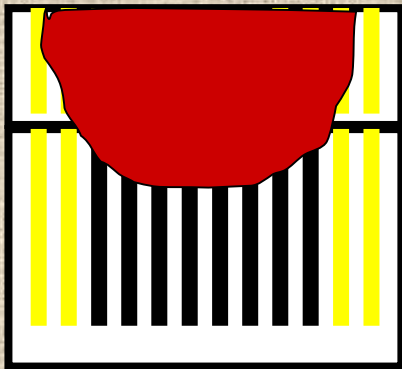
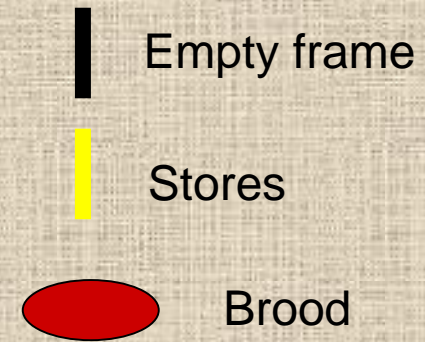
Moving boxes with the aim of ensuring the maximum number of combs beneath the queen excluder available for the queen to lay

How achieved depends on hive configuration

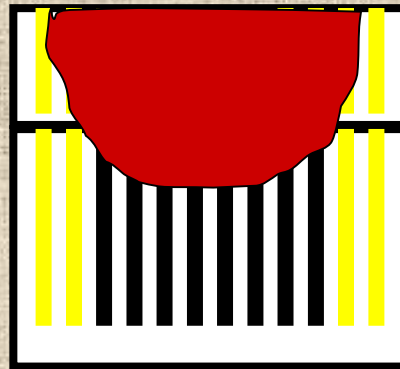
Only possible if running a two box system

- Target is to have brood in contact with queen excluder over most of its area
- Avoid a honey ceiling in the upper brood box
- Management of brood and a half (see Welsh Beekeeper No. 172 Spring 2011)
- **Detail of management depends on position of brood nest (see following diagrams 1-3)**

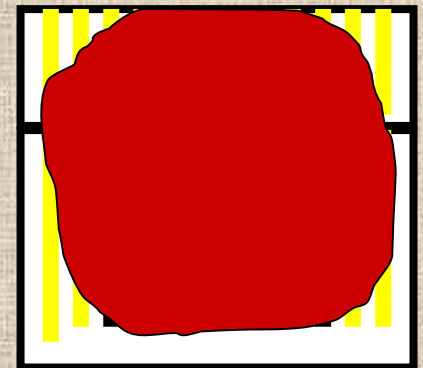
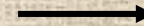
Example 1. – brood nest in high position mostly in shallow brood box



Does not require
manipulation



No management
required - OK as it s



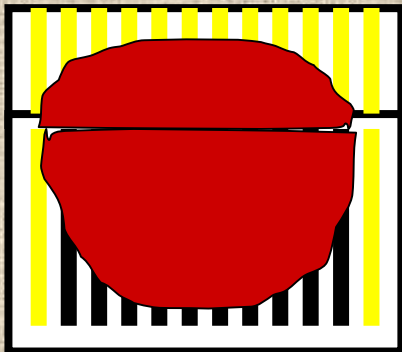
2-3 weeks later

Example 2. – brood nest in mid-position between deep and shallow brood boxes

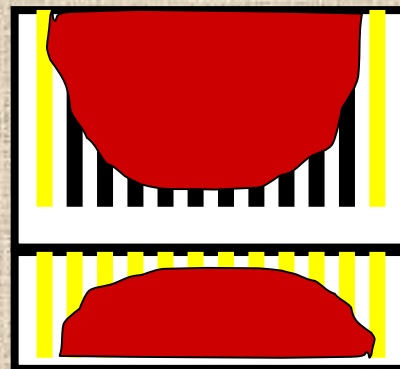
Empty frames

Stores

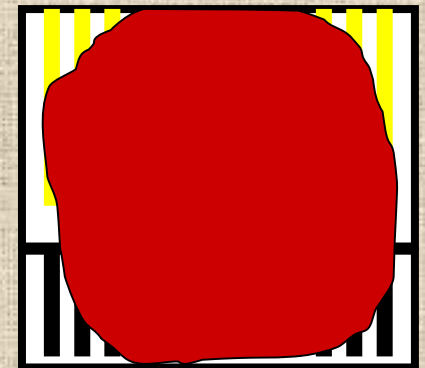
Brood



Before boxes swapped

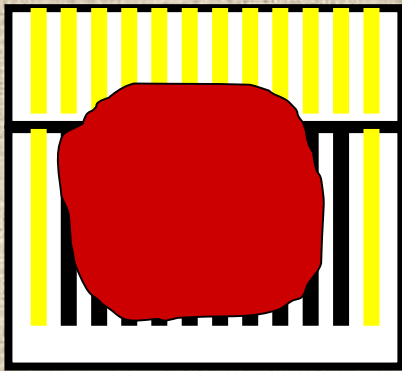


After boxes swapped
– shallow on bottom

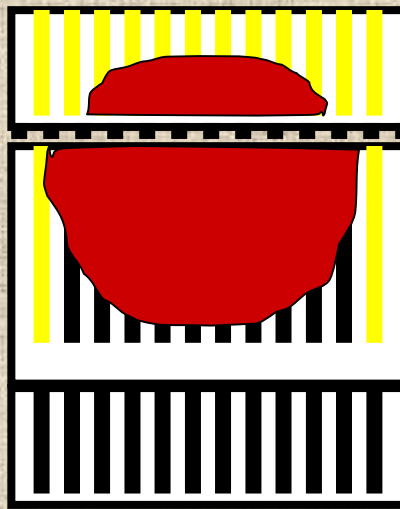


2-3 weeks later

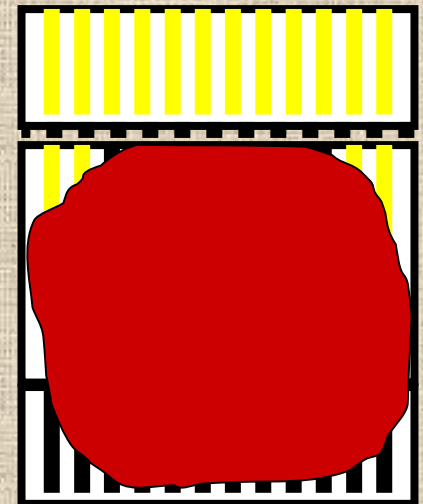
Example 3. – brood nest in low position mostly in deep brood box



Before boxes swapped



After boxes swapped – ex-shallow brood on top of QE, new shallow brood at bottom



2-3 weeks later

A conflict of advice - does the queen lay down or up?

- Most books say that combs containing brood should be moved down and new comb for the queen to lay moved up – seems logical?
- Our experience is totally different and we find that the queen more readily lays down
- Empty combs above the brood nest tend to be used for stores whilst those below are always used to raise brood – no permanent storage occurs below the brood nest
- Any stores placed under the brood nest are removed and comb becomes available for laying
- I do have some sort of explanation for this conflict but can anyone shed some light?

Management of double brood

- Configuration required only with a very prolific type of bee – less common in Wales
- Because frames the same size can be done by moving frames not boxes

Management to give queen maximum area to lay-:

- a) Move brood up (into top box)
- b) Move empty frames and food down – uncapping food if necessary

Food under brood nest will be removed and queen will be able lay down as much as she needs

Box management – honey supers

Not a complicated matter:-

- Add supers when flow expected or when previous super(s) full of bees
- Add at top or bottom? – top usually considered best for honey production (counter intuitive?)
- Boxes of foundation should be added low down, either on top of queen excluder or next up
- Remember that the volume of nectar is 3-4 times that of the end product – honey
- Bees need extra room to process honey efficiently

Does super management influence swarming?

- Not sure on this question
- Generous supering certainly **NOT** a substitute for poor management below the queen excluder
- Drawing wax in supers is supposed to inhibit swarming
- Gives plenty of space for bees to hang-out but still come down into brood area in poor weather
- Large amount of space in supers is supposed to promote foraging – but overdone produces half filled boxes and frames

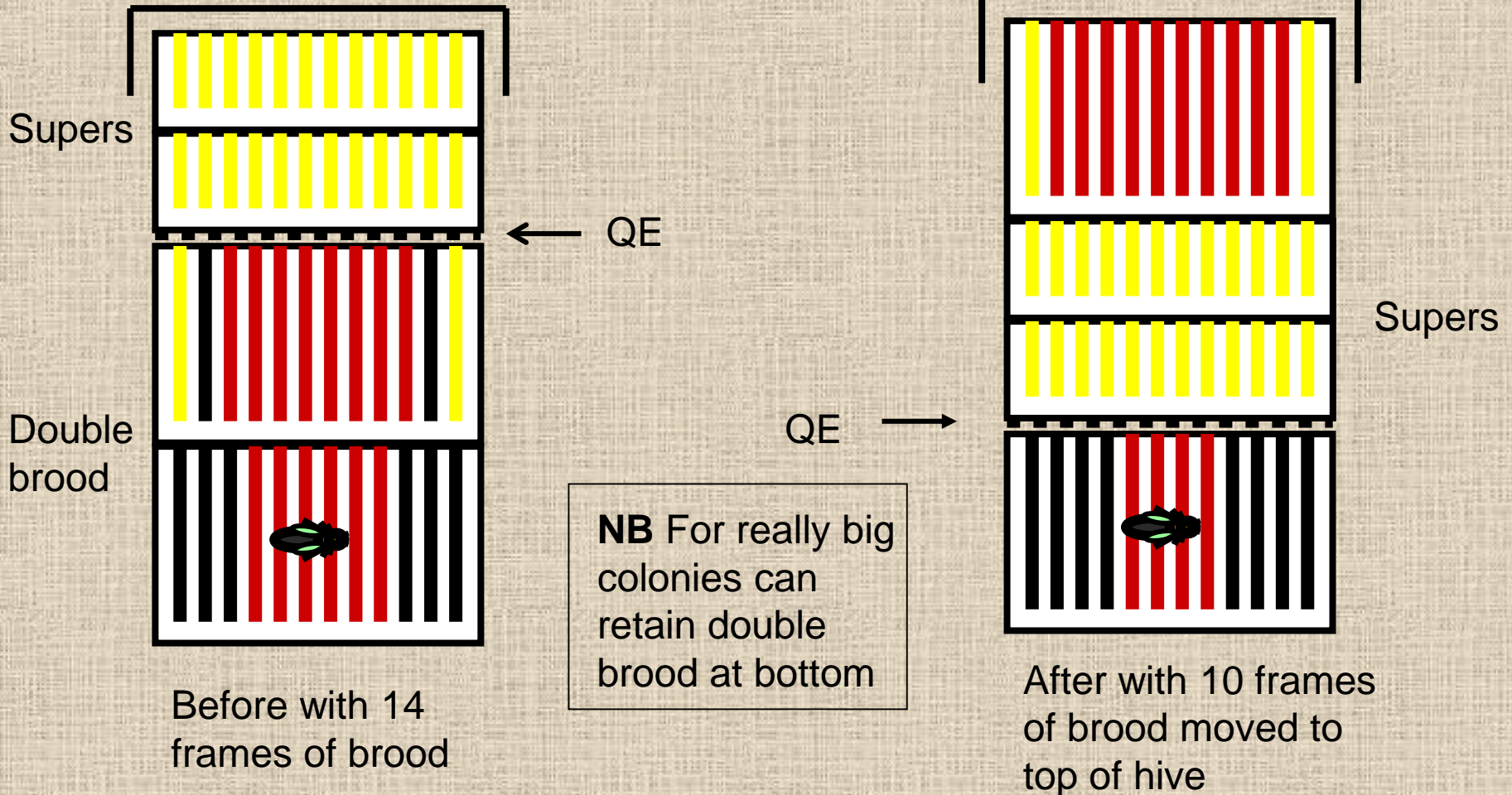
PART 3. Brood relocation

- One of the oldest tricks in the book!
- **Demaree method** goes back to 1892
- Consists of removing frames of brood from bottom of hive and relocating them in a box at the top of the hive – above the supers
- Bit like a dump box but each hive has its own
- No brood removed from hive so colony size not affected

The Demaree Method

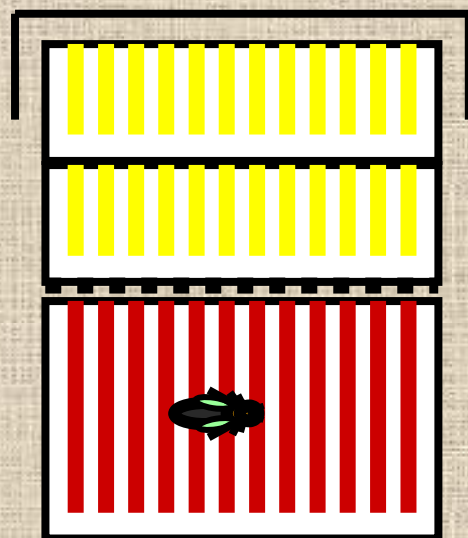
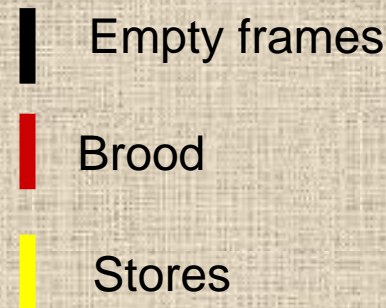
- Many variations of the method
- **Basic principle is that removal of brood from the bottom of hive relieves congestion in the brood nest and inhibits swarming impulse**
- **Achieved because a significant number of nurse bees follow the brood to top of hive**
- In full version of method, frames from which brood has emerged at the top are returned to bottom of hive in exchange for ones containing more recent brood (a frame circulation system)
- Originally designed for hives on double (or triple) deep brood

Classical Demaree on hive with double brood boxes and 14 deep frames of brood



Demaree done on hive with single deep brood box with 12 frames of brood

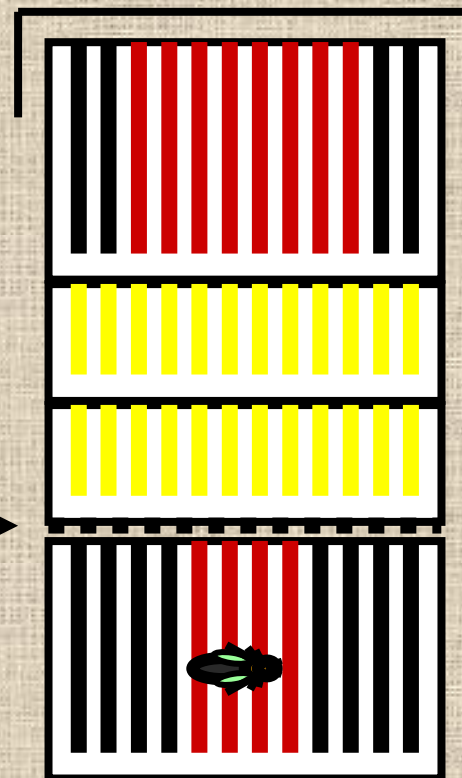
NB Hive could have had a half brood which would be left at bottom either over or under deep brood



Before with single deep brood and 12 frames of brood

Supers

QE



After with 8 frames of brood moved to top and 4 remaining at bottom

Downsides to Demaree

- Queen cells may be made in top box – need to check and destroy
- If going to circulate frames between top and bottom, need to be pretty sharp – as soon as brood emerges cells get filled with honey
- At end season usually have to extract honey from brood frames
- Possibly affects honey quality but no great problem if combs are renewed regularly

PART 4. Splitting the hive (the BIG hammer)

- Previous methods of pre-emptive swarm control have kept colony in one piece
- Splitting different now create 2 (potential) colonies from 1
- **However, splitting hives is the most powerful and reliable method of pre-emptive control**
- Splitting serves dual purpose of swarm control and making increase/raising a new queen
- A well established management practice for heather honey - make a nuc early in season and re-unite with main colony to go to heather

Is splitting the enemy of a good honey crop?

- Often said making a nuc from a colony costs a super of honey – so splitting might be worse?
- Splitting always better than just letting hives swarm
- Really depends when splitting is done
- If it is done at the right time (directly after the spring flow) it can give an enhanced yield
- The 2 resultant colonies can produce more than the original 1 (even if it didn't swarm!)
- One colony made 7 nucs (2 sessions), yielded 110lbs honey and no winter feeding

Here's one we split last season



Result

- A bit over-supered (only needed 3 supers on each part)
- Top colony (with new queen) gave 60lbs of honey
- Bottom colony (with old queen) gave 75lbs of honey
- Total yield 135lbs
- But it was something of a problem when it came to harvest time!!

How to split a colony when swarm control the main aim

Aim to achieve control that will last rest of season-

How much control is enough – your bees, your judgement – but you must:-

- Ensure both sides of split are viable
- Timing right for colony
- Timing right for honey production

A controlled split gives much better (colony function) than an artificial swarm

Paradoxically a natural swarm is the best split possible

It's all about the age class distribution

The controlled split

- One part the split has the **old queen** the other part has to **raise a new one**
- The **queen-right part** normally remains on the old hive site where it will gather the flying bees
- The **queen-less part** goes to new location – either a new stand or (using a split board) on top of the queen-right part
- This part will lose all its flying bees back queen-right part – must allow for this

The queen-right part

This part is normally the main honey producer

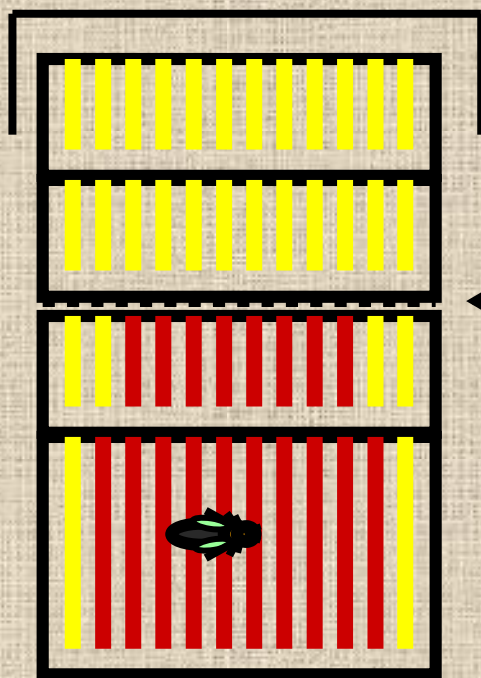
- The queen needs enough nurse bees and follow-up brood to enable her to lay flat-out on the new combs provided and re-build colony
- **BUT** not so much that colony quickly returns to a condition where it may decide to swarm
- **Why not take up tight-rope walking instead?**
- No precise recipe is possible and this were beekeeper experience and judgement comes into play

The queen-less part

- This part will need to make a new queen
- It must have the resources – brood, nurse bees and food – to do this properly
- Produced under right conditions emergency queens are not inferior to swarm queens
- This is more easily achieved (less bees and brood) on a split board than on a separate hive stand – warmth from the colony below
- Minimum is probably about 5 deep frames of brood on a split board (perhaps 7 on a new stand)
- Another possibility is a complete (nothing removed) shallow brood

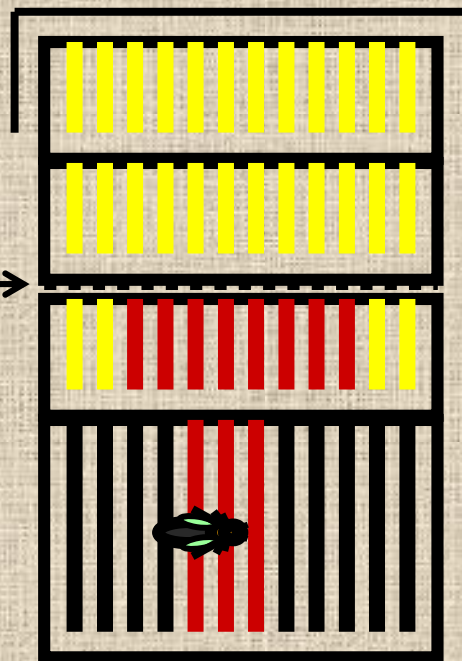
Splitting example 1 – hive on brood and a half and 9 deep frames of brood, 7 of which placed new box on new hive stand

- Empty comb
- Brood
- Stores
- Queen

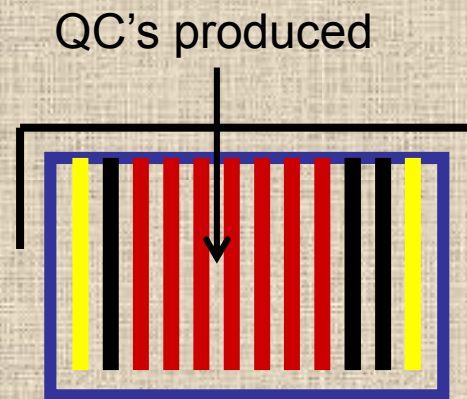


Before – hive on brood and a half + 2 supers

← QE →

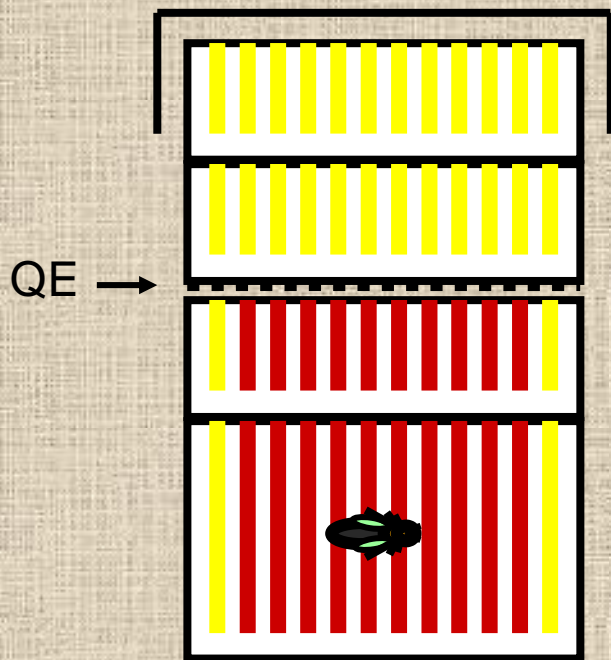


After - 7 deep frames of brood removed, 8 shallow frames of brood remain in place

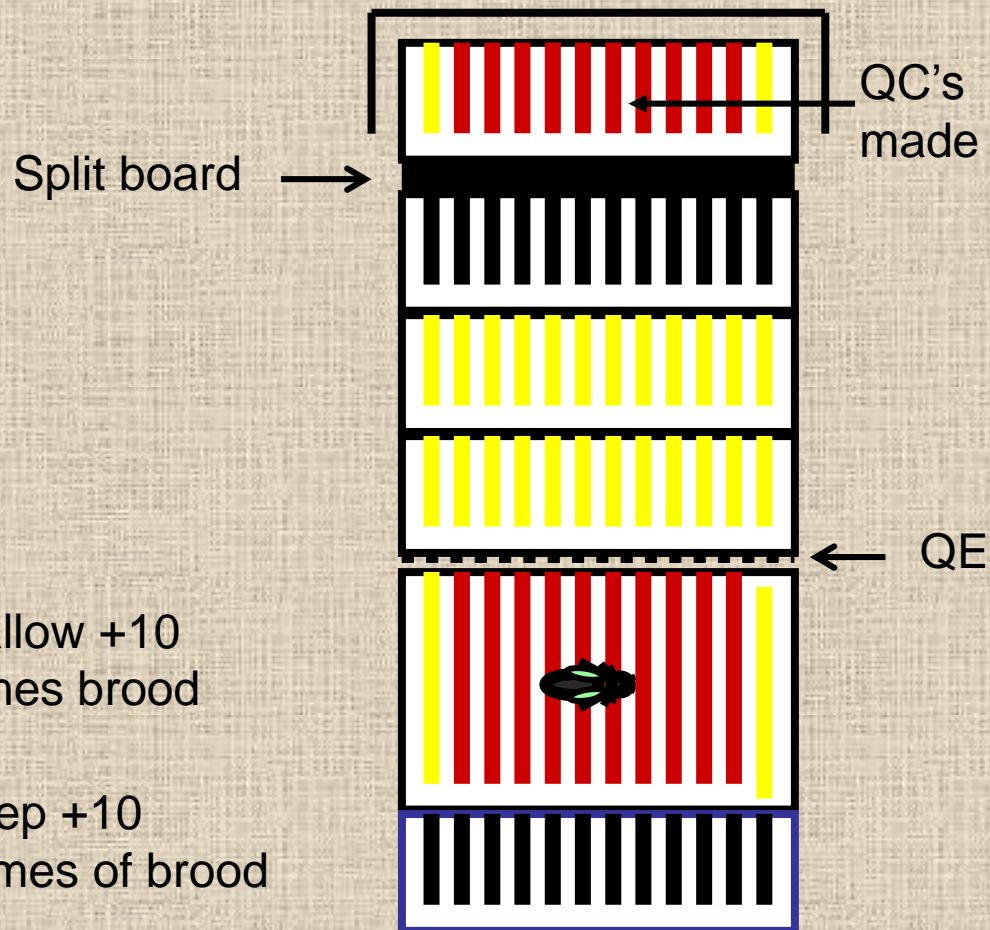


New box with 7 deep frames of brood

Splitting Example 2 – putting shallow brood on split board and empty shallow brood to bottom



Before – hive on brood and
a half with 2 supers



After – shallow brood put to top on split
board with new empty shallow brood at
bottom

Splitting highly flexible

- The above are just two examples of split
- When familiar with the process can design each split to meet the situation
- Splitting creates increase that you may or may not want
- Easy to re-unite at a latter date
- Before a honey flow (to produce a super-colony) is one way to go
- Easier to re-unite with a split board that has a mesh panel – common hive smell

You can't win them all!

- Even the best pre-emptive swarm control (includes splitting) will not work 100% of the time
- Will always delay swarming impulse
- Frustratingly a few colonies may retain the impulse up to end of the swarming season (late June or July) – just as the main flow is starting!
- Could hardly be a worse timing
- What do you do then?
- There **are** methods but that brings us into reactive swarm control – but that's another story!

The ultimate proof of failure of pre-emptive swarm control



That's all folks

